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AUTHOR Ihnat, Mary Ann
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ABSTRACT

This study was designed to investigate whether the listening ability of second-grade students could be improved using compressed-speech training as compared to normal listening training. The subjects were 95 second-grade pupils in a low-to-middle class suburban community in central New Jersey. The plan was to expose an experimental group to fourteen stories presented at 200 words per minute over a period of five weeks. The control group listened to the same stories presented at the normal rate of 140 to 150 words per minute. Both groups answered comprehension questions which immediately followed each story. Pretest instruments were the Goodenough-Harris Draw-A-Man Test and the Durrell Listening Test. The posttest instrument was another form of the Durrell Listening Test. Some of the findings were that no evidence was observed which would indicate that a gain in listening skills will result when a faster rate of presentation is used as compared to a normal speaking rate of presentation and neither the control nor the experimental group improved their listening skills. (Author/MKM)

THE EFFECT OF LISTENING DRILLS UTILIZING COMPRESSED SPEECH AND STANDARD SPEECH UPON THE LISTENING COMPREHENSION OF SECOND-GRADE CHILDREN

AN ABSTRACT OF A THESIS

SUBMITTED TO THE FACULTY

OF THE GRADUATE SCHOOL OF EDUCATION

OF

RUTGERS

THE STATE UNIVERSITY OF NEW JERSEY

BY

MARY ANN IHNAT

IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

OF

MASTER OF EDUCATION

COMMITTEE CHAIRPERSON: W. DONALD CLARK, ED.D.

NEW BRUNSWICK, NEW JERSEY JUNE, 1975

ABSTRACT

This study was designed to investigate whether the listening ability of second-grade students could be improved using compressed-speech training as compared to normal listening training.

The general plan was to expose an experimental group to fourteen stories presented at 200 words per minute over a period of five weeks. The control group listened to the same stories presented at the normal rate of 140 to 150 words per minute. Both groups answered comprehension questions which immediately followed each story.

The subjects were 95 second-grade pupils in a low-to-middle-class suburban community in central New Jersey.

Pretest instruments were the Goodenough-Harris Draw-A-Man Test and the Durrell Listening Test. The posttest instrument was another form of the Durrell Listening Test.

The main statistical analysis concerned comparisons of mean scores on all measures between treatment groups. Statistical significance was evaluated by the t test. At the conclusion of the training period, no significant difference was found between mean scores of

the experimental and control groups.

The results of this study did not support the hypothesis that the procedures used will result in a gain in listening skills. That is, no evidence was observed which would indicate that a gain in listening skills will result when a faster rate of presentation is used as compared to a normal speaking rate of presentation.

Neither the control nor the experimental group improved their listening skills. Analysis of the method used seems to indicate a need for further experimentation with other rates of speed, with the time period or with listening tests. The increase from 150 to 200 words per minute may not have been a sufficient increase to show a difference in results. A longer time period between testing may have been necessary to produce results. A different intervening variable between training sessions could have been more effective. The listening test may not have adequately measured listening.

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CHAPTER I

INTRODUCTION

Through the years the question has been asked, "Can we learn more successfully through hearing and listening, rather than through seeing and reading?" Research studies yielded inconsistent and often conflicting results. Witty and Sizemore (1958) summarized pertinent investigations and concluded that listening is an effective method of learning certain materials. They also concluded that listening, as compared with reading as a way of learning, seems more effective in early childhood since most young children cannot read. As the material becomes more difficult, reading seems to be more effective.

A considerable number of studies have cited the importance of developing listening skills and the relationship of listening to reading; but time-compressed speech, where the word rate of a listening selection is increased and the time required for its delivery is decreased, seems to be an area which has not been sufficiently explored, especially at the second-grade level.

Studies have been done using time-compressed

speech with older children and college students, but there seems to be a scarcity of studies using primary-age children. Since primary-age children must do a lot of listening, this study was designed to investigate whether the listening ability of second-grade children could be improved by using time-compressed speech.

The effects of training on listening comprehension and on time-compressed speech are not conclusive. Some researchers indicated beneficial effects of training, and other researchers did not substantiate these findings. Further research seems to be needed, especially with younger children.

Looking at time-compressed speech from a more practical angle, practice drills utilizing time-compressed speech might be a saving in classroom time.

Statement of the Problem

Is compressed listening training in the second grade more effective for improving listening ability than is normal listening training?

It was hypothesized that there would be a gain in listening skills using a faster rate of presentation as compared to a normal speaking rate of presentation as measured by the Durrell Primary Listening Test.

Importance of the Study

That listening is important has long been realized. Rankin (1929) reported that adults spend approximately three times as much time in listening as in reading, and that estimate was made in the beginning days of radio and before television! One would assume that the estimate would be much higher today. Bracken (1971) reported that the elementary pupil spends from 1/2 to 2/3 of his school day listening.

Orr (1968) feels that

> . . . there is some evidence that thought rate easily exceeds the rate at which material is typically presented in the auditory mode, with very undesirable effects of mind-wander, loss of attention, and the like. And there is no apparent reason to assume that people cannot be taught to think faster, or at least to make more efficient use of the time they spend in absorbing and processing educational information. Anything that has potential for improving the efficiency of education today; even if it does not improve the quality, has great significance [p. 291].

The traditional concept of the teacher as a lecturer imparting knowledge to the students is changing. Instead of learning to read from a basal reader alone, the child has a variety of materials available to him. Record players, tape recorders, film strip projectors are just several types of equipment available.

Listening, along with reading, is an important communication skill; and it would seem that rate-

controlled speech could play an important role in education to help improve the efficiency of communication. The rate of presentation could be adjusted to the difficulty of the material and the capacity of the listener to accommodate it. Some speech is too fast and some speech might be too slow.

Definition of Terms

Compressed Speech

When the word rate of a listening selection is increased, the time required for its delivery is compressed. This is called compressed speech.

The normal rate of speech is approximately 150 words per minute. Increasing the rate of speech to 175, 200 or more words per minute can be done by the Eltro Information Rate Changer or a similar instrument. Segments of recorded speech are discarded and resulting gaps are eliminated. This method relies for its success upon the amount of redundancy in spoken language. The discarded segments are small enough that the human ear cannot detect their absence, and no entire speech sound is ever lost. This method is free from distortion in voice quality.

Listening

Listening may be defined as the act of giving attention to oral language, not merely in hearing the symbols, but in receiving ideas and reacting to them with understanding (Reiland, 1970). In this study, the activity of listening is that which is measured by the Durrell Primary Listening Test.

Listening Drills

In this study, listening drills refer to Science Research Associates' Listening Skill Builders recorded on tape and presented at the rates of 150 and 200 words per minute.

Limitations of the Study

This experiment was limited by a time factor in that it lasted five weeks. A longer period of time may have been necessary to produce an improvement in listening scores.

It was also limited in the size of the sample. A larger sample would have enabled use of several other rates. The increase to 200 words per minute is only a 33 percent increase. A greater difference might have been more likely to have an effect.

CHAPTER II

REVIEW OF THE LITERATURE

A survey of the literature demonstrated that there is a wealth of material available on listening and there are also many studies dealing with compressed speech. Including all of this research would make this chapter rather unwieldy. Therefore, for the purposes of this paper, studies were included which dealt mainly with the effect of training on compressed speech and listening. As background information some early research studies on listening and compressed speech are also included.

Listening

Many early studies were concerned with determining which method, auditory or visual, was best for learning. Initially, many of the studies used lists of isolated concepts, words, or digits to determine the effect of the modalities on memory. Later, meaningful connected materials were used; and comprehension was studied.

Russell (1928) experimented with approximately

690 students in the fifth, seventh and ninth grades. The students in each grade were divided into three groups of equal ability according to intelligence tests. The material was presented by the regular classroom teacher in three different ways. In one case it was read to the students twice in succession. The second procedure was to give the students the material and ask them to read it at their normal rate, giving them the same amount of time for reading as the teacher took in the first method. The third group was simply told to read the material through twice at their normal rate and as soon as they finished to stop and raise their hands. After the presentation of the material the pupils were given two tests, one of the essay type and other true-false. The results showed that students in grade five learn more by having material read to them; auditory and visual methods are equal in grade seven, and reading is more effective for learning in grade nine.

Witty and Sizemore (1958, 1959) reviewed and summarized the early studies on listening. They concluded that although experimental procedures often yielded inconclusive or contradictory results, they did, in general, suggest that some types of learning might be accomplished with almost equal efficiency by visual or by auditory approaches--in many situations, perhaps with

equal success through either approach. Any difference in learning efficiency may be traced not to the visual or to the auditory presentation, but, to factors such as the difficulty or nature of the material to be presented, and its suitability in terms of the experience and interests of the groups studied.

Listening Training

In reviewing the literature, there seem to be many studies that indicate that listening comprehension can be improved through instruction. There are also a few studies that show no improvement in listening comprehension or study skills development.

Hollingsworth (1964, 1965) in two related studies concluded that listening comprehension was not affected by the two listening programs he used. The first study involved 535 eighth-grade pupils, divided into three groups according to intelligence and reading tests. One experimental group was given the Modified Educational Developmental Laboratories' Listening Program. The second experimental group was given the listening tapes of the Modified Science Research Associates' Listening Skill Builders Program. The control group was not given any formal listening program. One taped lesson was given each week for a period of ten weeks. The lessons

were approximately fifteen minutes in length.

In the second study, Hollingsworth selected 28 fifth-grade pupils, divided into an experimental and a control group. The listening exercises were thirty tapes commercially produced by Educational Developmental Laboratories. The experimental group listened to a tape three times a week for ten weeks. The program included workbook exercises after listening to the tape. The control group continued with its normal school program. No significant differences were found beyond those expected by chance in reading achievement, listening comprehension or study skills development.

Reeves (1965) also concluded that listening training does not favorably affect the retention of listening and reading achievement. Twenty fourth-grade classrooms were randomly selected and divided into an experimental and a control group. The experimental group was given thirty tape-recorded listening lessons taken from the Elementary and Intermediate booklets of the Gates-Peardon Reading Exercises. Each of the fifteen-minute lessons consisted of four short selections followed by questions on main ideas and details. The lessons were to be substituted for part of the regular reading program over a fifteen-week period. No significant differences were found between the mean gain

listening and reading scores of the two groups after the experimental treatment.

In contrast to the above studies, Heilman (1951) concluded that listening ability of college students can be significantly improved through a program of training in listening. Two random samples of 454 college freshmen were used. The experimental group was given one form of a listening test developed by Heilman as a pretest, then special training in listening, and finally the other form of the listening test as a criterion test. The control group was given the pretest and posttest of listening ability at the same time as it was given to the experimental group, but the control group received no special training in listening. The experimental group scored significantly higher than the control group.

Erickson (1954) also worked with college students. Observations of six experimental and six control classes of 260 college freshmen from two colleges were scattered over a period of two years, each group study lasting twelve weeks. The experimental classes were given one lecture on how to listen and eighteen training exercises in listening during the term. Experimental and control classes were given the same instruction with the exception of the listening training given the

former. The lecture and training exercises took up about four hours of class time each term. Both experimental and control sections were given the Brown-Carlsen Listening Comprehension Test at the beginning and at the end of the training period. Results showed that listening comprehension of college freshmen can be improved significantly by systematic instruction in listening. In Erickson's experiment, students in the middle and lower intelligence groups made significantly greater gains in listening comprehension than those in the higher group.

Hollow (1955) worked with intermediate-grade children. Six hundred fifth-graders enrolled in sixteen midwestern parochial schools were divided into two equivalent groups. The experimental group received twenty-minute listening lessons consisting of three parts: the preparatory stage where the children were taught listening skills, a listening stage where the teacher read the selection and an evaluative period. The training period lasted six weeks. Evidence gathered from this program showed that the listening skills of the intermediate-grade pupils involved in the experiment were appreciably improved by a planned program on instruction.

Canfield (1961) also worked with fifth-graders

in trying to provide information on the effectiveness of two types of instruction in listening. One type, he called "direct instruction," and was designed to improve a pupil's listening through practice in listening skills and through discussions of the qualities of a good listener. The second type of instruction, called "indirect instruction," was designed to improve listening by systematic use of listening in the social studies. Three groups of fifth-graders were formed to provide the experimental and the control groups. All the pupils took alternate forms of the STEP listening test and a reading comprehension test. The results of this study indicated that both the direct and the indirect approaches to listening improvement can be effective in the intermediate grades.

Summary of the Literature on Listening Training

A summary of the listening training studies revealed conflicting findings. Many of the studies indicated that listening training will improve listening skills, but a few studies also indicated the opposite point of view.

Some of the conflict may be partly due to the kinds of instruction given, the type of test used, the variation in the length of the experiments, and the

interest level of the students.

Time-Compressed Speech

There seems to be two methods of accelerating speech which have received attention in the literature: the speed-changing method and the sampling method. The speed-changing method is accomplished simply by altering the playback speed of a recorded message. At higher rates of speed, this procedure produces a distortion in vocal pitch and quality.

In the sampling method, segments of the original recording are deleted. The discarded segment is so small that no entire speech element is lost; it is so small that the human ear cannot detect its absence. This is accomplished by electromechanical devices such as the Tempo-Regulator, the Fairbanks Model, the Eltro Information Rate Changer, the digital computer, and Harmonic Compressor developed by Bell Telephone Research Laboratories.

Time-compressed speech is not new. Fletcher (1929) reported on accelerating speech phonographically. He speeded up the playback mechanism of a record. While there was a rise in pitch, the message remained intelligible for moderate rates of acceleration.

Steinberg (1936) also reported that speech rates

could be moderately increased without a great loss in intelligibility.

Goldstein (1940) studied the effects of presenting connected meaningful material at several rates ranging from 100 to 322 words per minute both auditorally and visually to 280 adults aged 18 to 65 years old. Passages were recorded on records by a live speaker at various rates of speed. A variable-speed motor was used to achieve the faster rates, producing a corresponding rise in pitch. He found that listening was superior over reading at rates ranging between 100-211 words per minute; the two skills were about equal at the 248-285 words per minute range, and listening was inferior to reading at 322 words per minute. Goldstein also found that more intelligent subjects grasped more at 325 words per minute than did the less intelligent at 100 words per minute.

Two of the early studies which seemed to influence the development of time-compressed speech were those by Gemelli (1934) in Italy and Peterson (1939) in the United States. Both researchers investigated the time duration necessary for the proper identification of a phoneme and discovered that there is a high degree of redundancy in speech.

Vilbig in a paper entitled, "Devices for Speech

Analysis and Compression," which was presented at the fifth annual Electronics Conference in Chicago, in 1949 described an electromechanical technique of time compression.

Almost at the same time as Vilbig's report, Anton Springer, a research scientist in Frankfurt, Germany, invented what was called an accoustical pitch and tempo regulator (Allan, 1967). This device, with improvements, subsequently became the Eltro model.

A few years later Garvey (1953) described his "chop-splice" technique. He manually chopped out portions of the speech record on a plastic base recording tape, then spliced together the remaining segments of the record tape to form a new intact record. He found that intelligibility did not drop below 80 percent until 67 percent of the speech pattern is removed. Garvey felt this supported the hypothesis that speech contains more cues than are necessary for good intelligibility under normal listening conditions.

Fergen (1954) used the speed-changing method to determine the level of listening comprehension at rates of 80, 130, 180 and 230 words per minute of 438 boys and girls in grades four, five and six. She used phonographic recordings of a narrator speaking at the different rates. The listening material consisted of

selections from the Iowa Every-Pupil Tests of Basic Skills, Silent Reading Comprehension subtest, in four equivalent forms. Multiple-choice questions were administered following each oral presentation rate. Fergen found that the speed of 130 words per minute effects the highest listening comprehension. At all three grade levels, listening comprehension increased from the presentation at 80 words per minute to 130 words per minute; but decreased at the presentation rates of 180 and 230 words per minute.

Shortly after Garvey's experiment, Fairbanks, Everett and Jaeger (1954) developed an electromechanical device at the University of Illinois, which performed the same thing automatically that Garvey had done with a razor blade.

Early researchers reported on the intelligibility of words or short phrases. Fairbanks, working with Kodman (1957), discovered that monosyllables may be compressed up to 75 percent of their original duration with little or no loss in intelligibility. Klumpp and Webster (1961) reported that short messages could be played back one and a half times faster and still remain intelligible. Kurtzrock (1957) reported that "intelligibility was unaffected over a wide range of time distortion."

Fairbanks, Guttman and Miron (1957a) in a series

of studies discovered that compressing connected speech from a rate of 141 words per minute to 282 words per minute resulted in approximately 90 percent comprehension. Compression to 350 words per minute resulted in only 50 percent comprehension.

Training in Listening to Compressed Speech

In another study, Fairbanks, Guttman and Miron (1957b) presented air force trainees with material twice instead of just once. The double presentation at the rate of 282 words per minute produced higher mean comprehension test scores than a single presentation at a slower rate of 141 words per minute. Comprehension was measured by percentage of correctly answered multiple-choice questions. The percentage of correctly answered multiple-choice questions increased from a mean of 58.0 percent for the single presentation to a mean of 65.4 percent for the double presentation. In terms of the amount learned, it was evident that the higher speed was more efficient than the slower speed.

In a related experiment, Fairbanks, Guttman and Miron (1957c) investigated whether the time saved might be used to add reinforcing material to the compressed message within the time of the original message, and that this might produce an increase in comprehension.

Thirty of the sixty comprehension test items were selected for addition of restatements and paraphrases. A procedure was followed similar to that which a speaker might adopt if he were revising a speech to emphasize certain specific points which he considered important. The resulting text was longer than the original text, but the longer text when compressed by 30 percent equalled that of the uncompressed short version in words and time, but not in rate. Both versions of the text were presented at normal rates and at compressed rates of 201 words per minute. The results indicated that the total number of correctly answered test items did not significantly differ between the short version and the long version at either rate of presentation.

Bixler, Foulke, Amster and Nolan (1961) using both technical and literary listening selections, found comprehension to be only slightly affected by increasing word rate up to 275 words per minute. However, in the range extending from 275 to 375 words per minute, they found an accelerated decrease in comprehension as word rate was increased.

Extensive research and analysis of speech compression and its application was done by Emerson Foulke et al. in his work with blind subjects. This work, at Louisville University, formed part of the Rapid Speech

Project, which was financially supported by the Cooperative Research Branch of the Office of Education, Department of Health, Education and Welfare (Bixler et al., 1961; Foulke, Amster & Bixler, 1962, 1964). These experiments provided evidence of the trainability of comprehension at rates beyond twice the normal speaking rate. Foulke noted that losses in comprehension, found to be statistically significant, did not reveal the full educational importance of the experiments. Foulke stressed that the time saved in presenting the material had great potential. Foulke (1961) emphasized this significance by pointing out that a practiced adult braille reader can be expected to read at about 110 words per minute on the average. When a blind person reads by listening to material read orally by a professional reader, he is receiving information at a rate of approximately 175 words per minute. Many practiced adult readers of print read at a rate of 400 or 500 words per minute, or even faster. A solution to this problem is the search for a way of increasing the rate of information transmission.

In a later experiment by Foulke (1966), the subjects were 123 blind children from grades seven, eight and nine from four state schools for the blind. These children had had little or no prior experience in

listening to accelerated speech. The results did not show a clear-cut superiority of speech compression with respect to connected speech, as did an earlier study. Foulke concluded that perhaps there were other factors concerned with human information processing ability that interferred with intelligibility of connected material once a certain point was reached in speech compression.

V[redacted] and Miller (1965) also investigated the effect of training by presenting five stories of approximately 1,350 words each delivered at a rate of 380 words per minute. Each of the fifty college freshmen and sophomores answered a multiple-choice test of comprehension after hearing each story. Comprehension scores rose through three trials and remained relatively unchanged thereafter. The authors concluded that

> . . . practice did increase the ability to comprehend very rapid speech, and the time required to adjust satisfactorily to this type of speech was rather short.

Orr, Friedman and Williams (1965) experimented with sixteen college students who were given training in listening to compressed speech over a period of three weeks. The practice materials consisted of five tape-recorded history passages compressed to speeds of 175, 325, 375, 425 and 475 words per minute. The subjects

were given multiple-choice comprehension tests based on the listening selections presented at the end of each week's practice. A control group was administered the test selections only, and the results were compared. The authors reported that statistically significant differences between the performances of the experimental and control groups at higher rates indicated that comprehension of compressed speech can be improved with practice.

In two other experiments, Orr and Friedman (1967, 1968) also studied the effects of practice on the comprehension of compressed speech. In the first study, three matched groups of college students were given a series of five daily practice listening sessions of one hour each, followed by a test. Prior to each test passage, one group was allowed to study a précis of the passage for 2½ minutes; a second group was given a list of about 130 key words drawn from the passage; and the third group was given no listening aid, as a control condition. After the fifth practice session and test passage, a final passage and test were presented, without listening aids, to test for any generalization of skill in listening. The results indicated that the two types of listening aids used did not improve comprehension of time-compressed speech as compared to the

performance of the control group.

In the second experiment, Orr and Friedman used a massed-practice procedure by exposing seven students to approximately eight to ten hours of daily practice over a one-week period. Daily multiple choice tests were administered to check progress. This method did not produce any better results than that of previous experiments using spaced practice of one to two hours per day for a total of 12 to 15 hours of practice.

Reiland (1970) investigated whether listening to compressed speech would improve reading ability of elementary school children. Three experimental conditions were established with 428 sixth graders. One group listened to the speeded tapes, ranging from 175 to 300 words per minute, while simultaneously reading the passages; the second group listened only to the same speeded passages; the third group simply read the passages. Alternate forms of the STEP Listening Test and the Gates MacGinitie Reading Test were administered prior to and following the training sessions, and the scores were compared. The training sessions extended over a period of six weeks with three training sessions scheduled each week.

The results of this study indicated that the different modes of presentation did not produce significant

differences in reading performance for either low or high intelligence groups. It appeared that children with low I.Q. or low achievers did not profit more from listening than from reading. Low I.Q. subjects performed better at slower rates. The difficulty level of recorded material should approximate the grade expectancy based on mental age. Retention seemed to be adversely affected when the material was either too easy or too hard. No real differences were found between performance scores of boys and girls when comprehension of compressed speech was examined.

Sticht (1971) presented the same selection twice at different rates of compression to army inductees. The subjects were divided into high and low aptitude groups based on their scores on the Armed Forces Qualification Test. Comprehension was measured by a "fill-in-the-blank" test. Comprehension scores for both high and low aptitude subjects improved under the double presentation; however, ". . . in no case did the double presentation improve comprehension over that obtained with a single presentation of the uncompressed selection [p. 81]."

Kussat (1974) worked with 567 junior college students in assessing how the rate of presentation affected the amount of information retained. These students were

divided into seven experimental groups. Each experimental group listened to the same 250-word selection at one of the following rates of presentation: 75, 100, 150, 200, 250, 300 and 350 words per minute. After the listening presentation, all the students took a reading storage test, based on the listening selection; and the scores were compared. The reading storage test measured information retained, which was defined as literal comprehension or exact recall of factual information. The mean scores on the reading storage test were as follows:

Presentation Rate	75	100	150	200	250	300	350
Mean Score	12.39	13.31	13.69	11.25	9.90	8.83	9.41

Kussat found that results indicated a slight and statistically not significant loss of information retained for the expanded rates of 75 and 100 words per minute. The loss of information retained for the compressed rates of 200, 250, 300 and 350 words per minute was statistically significant as compared to the 150 words per minute presentation rate. Kussat found that individual differences play an important part in that inspection of the distribution of scores within the 200 and 250 words per minute groups indicated that at least for some students, no appreciable loss of information

had occurred at those presentation rates.

Summary of Literature Related to Training in Compressed Listening

In reviewing the results of the studies investigating the effect of compressed listening training, the following findings are related to the present study: (1) Compressed speech can be transmitted at speeds faster than the normal speaking rate without appreciable loss in comprehension for some students with some kinds of material, with the comprehension level being directly related to the difficulty of the material and the ability of the listener. (2) Comprehension of compressed speech may be improved with practice, but the improvement takes place rapidly and does not appear to continue with additional practice.

CHAPTER III

METHOD

Many questions about the nature of compressed speech and its effects upon listeners remain unanswered. This study was designed to investigate whether listening to compressed speech selections is more effective for improving listening ability than is listening to normal speech selections. It was expected that a comparison of normal listening training with compressed listening training might help to clarify the kind of training most useful for improving listening ability.

This chapter describes the population used in the study, the training and testing procedures that were followed and the way in which the collected data were statistically analyzed.

Subjects

Subjects for the study were 95 second-grade students in a 450-pupil elementary school in Bridgewater-Raritan school district. The school is situated in an all-white neighborhood of low to middle class socio-economic group. The 95 pupils chosen for this study

had been homogeneously assigned to four classrooms according to reading test scores at the beginning of the school year. These pupils were then randomly assigned to two groups by this investigator. One group served as an experimental group and the other as a control group.

The two randomly selected groups were then compared as to the mean I.Q. for each group based upon scores attained on the Goodenough-Harris Draw-A-Man Test. Scoring was done according to Harris by the experimentor.

It was therefore assumed that the two groups were equal with respect to intellectual ability based upon the randomness of the assignments to the groups and confirmation of the I.Q. distribution attained with the Goodenough-Harris Draw-A-Man Test (see Table 1).

Materials

The materials used in this investigation were: (a) listening materials and (b) testing materials.

Listening Materials

The listening drills consisted of 14 stories taken from Science Research Associates' Listening Skill Builders, which is part of the SRA Reading Laboratory Ib. These stories were recorded on electromagnetic tape

TABLE 1

I.Q. SCORES OF EXPERIMENTAL AND CONTROL GROUPS
BASED ON GOODENOUGH-HARRIS DRAW-A-MAN TEST

	N	Mean	S.D.	Mean Difference	t	Significance
Experimental Group (200 WPM)	48	99.0	10.83			
Control Group (150 WPM)	47	99.4	9.78	.4	.19	N.S.

in the Rutgers Radio Center by a male voice. The original recordings were recorded at speeds varying from 140 to 150 words per minute. Each of the original recordings were verified and timed. The tapes were then compressed to a speed of 200 words per minute by a laboratory technician at the Rutgers Language Laboratory employing the Eltro Information Rate Changer.

The Eltro Information Rate Changer is manufactured in Heidelberg, West Germany, and marketed in the United States and Canada by Infotronic Systems, Inc. This equipment, donated to the Rutgers University Graduate School of Education by the Gotham Audio Corporation, is capable of reproducing a 15 inches per second recorded tape at any speed between 50 percent and 180 percent of normal recorded speed without any change in recorded pitch or tonal level. The unit works with any tape recorder capable of handling two reels (supply and take up) needed in playback. The Information Rate Changer's most critical component is its rotating head assembly, which consists of a single magnetic head coil with four separate playback head gaps spaced exactly 90 degrees apart on its perimeter. Speech may be compressed or expanded by first recording the speaker on a normal tape recorder operating at 15 inches per second. The tape is then threaded through the Information Rate

Changer. The Information Rate Changer's output is connected to both the input of any ordinary tape recorder and an amplifier-speaker combination for listening. At the turn of a knob, the original tape is run through the Rate Changer; with the turn of another knob, calibrated in percentage of the original time, changes are made in the tape's linear speed over a wide range and, with it, the speed of reproduction of the recording.

The Eltro Information Rate Changer is the successor to the device used in Foulke's research (the Tempo-Regulator). Its mechanism is described by him (in Foulke & Sticht, 1967).

The Eltro Information Rate Changer, like the Tempo-Regulator, is a device where the temporal value of retained portions of speech is variable, but the temporal value of discarded portions is fixed by the distance between playback heads along the surface of the rotating cylinder that samples the tape to be compressed. That is to say, the temporal value of discarded portions is not variable. The Eltro Information Rate Changer is unselective with respect to the parts of a message that are discarded.

Brief taped directions were played to the students immediately before each taped story. These directions were recorded and played at the normal speaking

rate.

Testing materials

Prior to the training exercises and at the completion of the training sessions the Durrell Listening Test, Primary Level was administered to all subjects. The choice of a standardized listening test at the elementary school level is limited. The Durrell Listening Test was selected because: (a) it was standardized for the grade being investigated, (b) it provided equivalent forms and (c) it provided an adequate ceiling for the superior students and an adequate floor for the poorer students.

Procedures

Immediately before the training session began, the Durrell Listening Test, Form DE, was administered to each group by the experimentor and the other second-grade teachers. Prior to testing, procedures of administration were discussed to assure uniformity of testing conditions.

The listening training exercises were supplementary to the regular reading instruction and extended over a period of five weeks. The training sessions were approximately 20 minutes long and were presented three times a week.

The children were divided into the two groups for each session and the listening exercises took place in two regular classrooms. The experimental group listened to stories compressed to 200 words per minute. The control group listened to the same stories at the normal rate of 140 to 150 words per minute. The tapes were played to the room at large. The loudness of the selections was adjusted to a "comfortable" listening level as determined by the experimentor and another teacher. The selections were clearly audible throughout the classroom.

Both groups answered comprehension questions which immediately followed each story. The questions consisted of ten multiple-choice questions, which check the pupil's ability to recall main ideas and important details in the story. The comprehension questions and the answer choices were read to the students and they were required to draw a line under the correct choice on an answer sheet. After all the children had marked the answers, the questions were read again and answers given so that the children could see their mistakes and learn from them.

Immediately after the last training session was completed, the Durrell Listening Test, Form EF, was administered to each group by the experimentor and the

other second-grade teachers.

Analysis of Data

Experimental Design

The experimental design selected for the present study was the pretest-posttest control group design. The comparisons were between an experimental group which listened to taped selections at 200 words per minute and a control group which listened to the same selections at 150 words per minute.

Statistical Analysis

The main statistical analysis was concerned with comparisons of mean scores between treatment groups on pre- and posttests. Statistical significance was evaluated by the *t* test. The .05 level was established as the acceptable level of statistical significance.

CHAPTER IV

RESULTS

This chapter presents an analysis of the data in light of the questions raised in Chapter I.

Pretests

Table 1, indicating the results of the Goodenough-Harris Draw-A-Man Test, has shown that the experimental and control groups appear to be equal with respect to intellectual ability.

Table 2 indicates the results of the pretest--The Durrell Listening Test, Form DE. T scores showed no significant difference at the .05 level between groups. Results of the two above tests led to the conclusion that the two experimental groups were similar. It was assumed that both groups were matched with regard to intelligence and listening ability.

Posttests

At the end of the training sessions, the Durrell Listening Test, Form EF, was administered as a posttest. Results are shown in Table 3.

Table 3 indicates that there is no significant

TABLE 2

LISTENING SCORES ON DURRELL LISTENING TEST

PRETEST, FORM DE

	Control Group			Experimental Group					
	N	Mean	S.D.	N	Mean	S.D.	Mean Diff.	t*	Sig.
Vocabulary	47	84.56	5.88	48	84.79	5.76	.23	.19	N.S.
Sentences	47	37.34	2.92	48	36.19	2.66	1.15	1.69	N.S.
Total Score	47	121.30	8.01	48	121.06	7.86	.24	.02	N.S.

*T scores not significant at .05 level.

TABLE 3

LISTENING SCORES ON DURRELL LISTENING TESTS

	Control Group			Experimental Group					
	N	Mean	S.D.	N	Mean	S.D.	Mean Diff.	t*	Sig.
Pretest (Form DE)									
Vocabulary	47	84.56	5.88	48	84.79	5.76	.23	.19	N.S.
Sentences	47	37.34	2.92	48	36.19	2.66	1.15	1.69	N.S.
Total Score	47	121.30	8.01	48	121.06	7.86	.24	.02	N.S.
Posttest (Form EF)									
Vocabulary	47	85.67	5.87	48	85.04	6.65	.63	.49	N.S.
Sentences	47	36.89	3.42	48	36.06	3.69	.83	1.14	N.S.
Total Score	47	121.94	9.56	48	121.31	8.55	.63	.036	N.S.

*T scores not significant at .05 level.

difference between the control and experimental groups when comparing pretest and posttest scores on a group basis.

Discussion

In posttesting, no significant difference was found between the two groups. This could be due to the fact that compressed listening training is not more effective for improving listening ability than is normal listening training. Perhaps both methods are so similar that they produce the same results. The fact that the increase from 150 words per minute to 200 words per minute is only a 33 percent increase may have affected the results. A greater increase in rate may have produced more of a difference in results.

The time period of 20 minutes a day, three days a week for five weeks may have been inadequate. A longer time period between testing may have been necessary to produce results. A different intervening variable could have been more effective. Perhaps the daily time period could have been longer and changed to twice a week; or a shorter time period could have been used, but the frequency increased. For example, three or four ten-minute periods per day.

The test used may not have been sensitive to any

changes that may have occurred. The Durrell Listening Test, Primary Level, was chosen because it was standardized for second grade and provided equivalent forms. Other changes may have occurred which were not measured by this instrument. It may be that this test did not measure listening, but measured vocabulary. There seemed to be words in the test with which the children were not familiar.

Since much of our speech tends to be redundant or repetitive, perhaps children are conditioned not to listen vary carefully to our normal speech since it will probably be repeated. Whereas, in the compressed speech, much of the redundancy is taken out and a person must listen more carefully, for it will usually not be repeated. It may take longer periods of training than that provided in this experiment to recondition children to listen carefully.

To provide incentives for listening more carefully, perhaps more could have been done with feedback methods. After listening to each story, the children answered ten multiple-choice questions. Immediately after they answered the questions, answers were read and the children corrected their own papers. Perhaps this was not enough and charts could have been made to record each child's progress from lesson to lesson so that they

could have a graphic record of improvement.

The stories the children listened to were approximately five minutes long. The rest of the 20 minutes was spent in writing answers to questions and discussing the answers. Since the stories were so short, there was not really much time saved by using the compressed speech. Time would be a factor if a student needed to listen to a tape for a longer period of time. There would seem to be a saving in time if the stories had been longer; for example, 10 to 15-minute stories compressed 100 percent instead of 33 percent.

It may be that teacher attitude had something to do with the results in the present study. The idea that this was a 20-minute break from routine may have prevailed. Listening skills were not reinforced and carried over into other areas of the curriculum. For listening skills to be improved, it may be necessary for the teacher to strengthen these skills throughout the school day.

To summarize, it may very well be that the design of the study did not adequately test the hypothesis that compressed listening training is more effective for improving listening than is normal listening training. The increase from 150 to 200 words per minute may not have been a sufficient increase to show a difference in

results. Also, it may be necessary to have a longer time period between tests. Five weeks may not have been enough time. The frequency and length of each training session may not have been adequate. The choice of the Durrell Listening Test may have affected the results in that changes may have occurred that were not measured by the test, or it may have measured other things--vocabulary for example. Also more could have been done with feedback to the children and teacher attitude.

Comparison with Similar Studies

The findings of this study are not in agreement with the earlier studies of Heilman, Erickson, Hollow, Canfield and others who found that listening skills could be improved. In the above studies, the frequency and duration of lessons varied: Hollow used 20-minute periods every day for six weeks; Canfield used 12 lessons; Erickson used a total of four hours training time; Heilman used six training lessons presented once a week for six weeks.

The part that seems to stand out is that the best results seem to have occurred when the training materials were built around specific objectives and teachers worked on specific listening skills.

In the Hollow (1955) study, the fifth-grade

teachers worked on specific listening skills. Some time was spent at the beginning of each lesson to prepare the children for a specific skill. For example, in introducing a lesson constructed to develop the ability to listen for sequence of ideas in a descriptive selection, the teacher drew attention to words and phrases such as "all of a sudden," "the first thing," "there is still another thing," as being signposts to guide the listener. Children were taught to use the signposts as aids to mental outlining of a sequence of events.

Canfield also worked with fifth-graders and found that listening skills could be improved through both direct and indirect methods. The direct approach involved working on specific skills similar to Hollow. The indirect approach involved no special instruction to improve listening skills, but included systematic listening to content material with related questions on comprehension. Both approaches showed an improvement in listening skills, although the direct approach showed a greater improvement in test scores than the indirect approach.

Erickson and Heilman also found that the listening skills of college students could be significantly improved through a training program in listening. The training materials were also built around specific

objectives.

The present study did not support earlier studies of Fairbanks, Guttman, Miron, Foulke and others who found that practice with compressed speech can improve comprehension scores. The compressed-speech training in the present study did not result in any significant change in pre- or posttest scores.

This study is in agreement with Hollingsworth (1964, 1965) and Reeves (1965), who concluded that listening comprehension was not affected by the listening programs they used. Both researchers used tape-recorded lessons. Hollingsworth (1965) felt that in order for improvement to take place there must be more involvement by the teacher than just merely turning on and off commercially taped programs. For listening comprehension to be improved, a planned program in which the teacher reinforces and gives his pupils many hours of practice in these skills may be necessary.

CHAPTER V

SUMMARY AND CONCLUSIONS

This chapter summarizes the present study, draws conclusions from the research results and suggests areas for further study.

Summary

This study was concerned with whether the listening ability of second-grade students could be improved using compressed-speech training as compared to normal listening training. The general plan was to expose an experimental group to fourteen stories presented at 200 words per minute over a period of five weeks. The control group listened to the same stories presented at the normal rate of 140 to 150 words per minute. Both groups answered comprehension questions which immediately followed each story.

The subjects were 95 second-grade pupils in a low-to-middle class suburban community in central New Jersey.

Pretest instruments were the Goodenough-Harris Draw-A-Man Test and the Durrell Listening Test. The

posttest instrument was another form of the Durrell Listening Test.

The main statistical analysis concerned comparisons of mean scores on all measures between treatment groups. Statistical significance was evaluated by the t test. At the conclusion of the training period, no significant difference was found between mean scores of the experimental and control groups.

Conclusions

The results of this study did not support the hypothesis that the procedures used would result in a gain in listening skills. That is, no evidence was observed which would indicate that a gain in listening skills will result when a faster rate of presentation is used as compared to a normal speaking rate of presentation.

The fact that neither the control nor the experimental group improved their listening skills seems to indicate a need for further experimentation.

Areas for Further Study

In education, it is very difficult to measure skills learned over short periods of time. There is a distinction between skills and knowledge. A person can see or listen to something once and learn a new bit of

knowledge, but skills take longer to learn. Perhaps the time period of this study was not long enough to show a gain in listening skills. Future researchers could experiment with the frequency and length of training sessions as well as the duration of the experiment.

Future researchers could investigate Hollingsworth's (1965) idea that in order for improvement to take place there must be more involvement by the teacher. A program could be planned whereby the teacher reinforces and carries over the listening skills into other areas of the curriculum. Researchers could also try to build training materials around specific skills.

We know that there are many kinds of listening and that these types of listening are relatively independent. That is, one who is skilled at listening for recall is not necessarily skilled in the act of evaluative or critical listening, and so on. Perhaps different types of listening skills are required for different rates of presentation.

Since some children improve more than others, it would seem that further investigations could look into individual differences with regard to listening and compressed speech. Using a larger sample divided into more homogeneous groups might point out which type of child

could benefit most from listening to compressed speech and from listening training.

The fact that some studies indicate beneficial results of listening training and others do not may be due to the tests used for measuring listening. It may be that the tests do not really measure listening, but measure knowledge of vocabulary, ability to draw conclusions or other skills. It would seem that an area for further investigation could be the area of the validity and reliability of listening tests.

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APPENDIX I

DURRELL LISTENING TEST

FORM EF

COURSE WORK FOR MASTER'S DEGREE IN READING

		Instructor
Fall, 1969-1970		
290:501	Instruction in Principles of Measurement	Dr. Geyer
320:561	Foundations of Reading Instruction	Dr. Fry Dr. Mountain
Spring, 1970		
320:564	Remedial Reading	Dr. Fry
Fall, 1970-1971		
299:565	Laboratory in Remedial Reading	Mrs. Kimberly
Spring, 1971		
290:513	Introduction to Early and Middle Childhood	Mr. Kimple
Fall, 1971-1972		
290:518	Psychology of Personality	Dr. Leon
299:566	Seminar in Reading Research and Supervision	Dr. Kling
Spring, 1972		
290:540	Introduction to Learning	Dr. Cox Dr. Gillhooly Dr. Montare
Summer, 1972		
610:581	Reading Materials for Children	Mrs. Cramer
Fall, 1972-1973		
290:521	Psychological and Educational Aspects of Mental Retardation	Dr. Clausen

Spring, 1973		Instructor
290:520	Education of the Emotionally Disturbed	Dr. Piaget
Spring, 1974		
320:599	Thesis Research	Dr. Fry

VITA

Name: Mary Ann Ihnat

Address: RD#2 Hockenbury Road, Neshanic Station, New Jersey 08853

Telephone: 369-3484

Educational Background:

High School:	Kearny High School Kearny, New Jersey
College:	Paterson State College Wayne, New Jersey B.A., June, 1962 Major--Elementary Education

Professional Experience:

1962-1964	Elementary Teacher Grade Four Washington School Kearny, New Jersey
1970-present	Elementary Teacher Grade Two Bradley Gardens School Bridgewater-Raritan School District Bradley Gardens, New Jersey